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In-plane shear strength analysis of Basalt Fiber-Reinforced Epoxy Laminates with Biowaste Catalyst Free Carbon

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This study aims to analyze the effects of carbon nanospheres (CNSs) on the in-plane shear strength of basalt fiber-reinforced composite laminate (BFR). The CNSs were obtained from an economical fibrous residue attained from the sago palm tree, which is known as biowaste sago bark. Hand lay-up method was used to fabricate the unidirectional basalt fiber-reinforced epoxy composite laminates. The epoxy resin was mixed with carbon nanosphere particles (i.e., 0.6 wt% - 1 wt%). In-plane shear tests have been conducted as per ASTM standards. In addition, Scanning Electron Microscope (SEM) analysis was conducted, in order to study the fracture surfaces of the composite laminates. The results demonstrated significant improvement in in-plane shear strength when carbon nanosphere particles were included in the basalt fiber-reinforced epoxy composite laminate. The best result was obtained at 1.0 wt% CNSs. It displayed an increment of 37.1% in in-plane shear strength, and 36.4% increment in modulus of rigidity, respectively, in comparison to neat basalt fiber-reinforced epoxy composite laminate. The improved accomplishment of CNSs/ basalt fiber-reinforced epoxy composite laminate is due to good distribution of CNSs particles in the epoxy matrix.

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